AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): A method comprising:

~~storing route data representing routes within a computer network;~~

storing, within a network router, a forwarding tree having a set of nodes, wherein the nodes include leaf nodes that correspond to destinations within a computer network;

storing, external to the forwarding tree, next hop data representing network devices neighboring the ~~a~~ network router; ~~and~~

storing, within the leaf nodes of the forwarding tree, indirect next hop data that maps ~~at least a subset of the routes represented by the route data to a common portion of~~ the leaf nodes of the forwarding tree to the next hop data, wherein at least two different ones of the leaf nodes of the forwarding tree contain indirect next hop data that references the next hop data for the same neighboring network device;

identifying a key within a network packet;

traversing a subset of the nodes of the forwarding tree within a network device by testing at least one bit of the key per each of the traversed nodes, wherein values of the tested bits in the key determine a path traversed along the forwarding tree until reaching one of the leaf nodes of the forwarding tree;

upon reaching a leaf node of the traversed path, using the indirect next hop data within the leaf node of the traversed path to select a next hop from the next hop data external to the forwarding tree; and

forwarding the packet to the selected next hop.

Claim 2 (Currently Amended): The method of claim 1, wherein ~~storing route data comprises storing a~~ the forwarding tree comprises a radix tree ~~having a set of leaf nodes, wherein each leaf node corresponds to a destination within the network~~.

Claim 3 (Currently Amended): The method of claim 2, wherein storing the indirect next hop data comprises:

storing, within each of the leaf nodes, a first reference to a primary next hop within the next hop data external to the forwarding tree, and

storing, within each of the leaf nodes, a second reference to a backup next hop within the next hop data external to the forwarding tree.

Claim 4 (Original): The method of claim 3, further comprising routing packets to the backup next hop in response to a network event.

Claim 5 (Currently Amended): The method of claim 2, wherein storing the indirect next hop data comprises storing a data pointer within each of the leaf nodes that references the next hop data external to the forwarding tree.

Claim 6 (Currently Amended): The method of claim 1, wherein storing the next hop data comprises storing an array of next hop data elements external to the forwarding tree~~, and further wherein the common portion of the next hop data comprises at least one next hop data element~~.

Claim 7 (Currently Amended): The method of claim 1, further comprising:

receiving a packet comprising network update information; and

modifying the ~~common portion of the~~ next hop data external to the forwarding tree in response to the network update information without modifying the forwarding tree.

Claim 8 (Original): The method of claim 1, further comprising:

storing routing information within a routing engine, wherein the routing information represents routes within a network; and

storing the route data, the indirect next hop data and the next hop data within a packet forwarding engine.

Claim 9 (Currently Amended): The method of claim 8, further comprising:

receiving a packet comprising network topology update information;

updating the routing information within the routing engine; and

issuing a message from the routing engine to direct the packet forwarding engine to modify the ~~common portion of the~~ next hop data in response to the network update information.

Claim 10 (Original): The method of claim 8, wherein storing the routing information includes storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine.

Claim 11 (Original): The method of claim 9, wherein storing the routing information includes storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine, and issuing the message comprises analyzing the copy to identify the next hop for modification.

Claim 12 (Currently Amended): A computer-readable medium having data structures therein that control forwarding of packets by a network device comprising:

a first data structure to store route data representing destinations within a computer network, wherein the first data structures is arranged as forwarding tree having a set of nodes, and wherein the nodes includes a set of leaf nodes that correspond to destinations within a computer network;

a second data structure external to the forwarding tree to store next hop data representing interfaces to neighboring network devices; and

a set of data structures, within the leaf nodes of the forwarding tree, to store indirect next hop data that map the leaf nodes of the forwarding tree to ~~at least a subset of the route data to a common portion of~~ the next hop data,

wherein the indirect next hop data causes the network device to, upon reaching a leaf node of a traversed path through the forwarding tree, select a next hop from the next hop data external to the forwarding tree and forward the packet to the selected next hop.

Claim 13 (Currently Amended): The computer-readable medium of claim 12, wherein the ~~first data structure stores a~~ forwarding tree comprises a radix tree ~~having a set of leaf nodes, wherein each leaf node corresponds to a destination within a network~~.

Claim 14 (Original): The computer-readable medium of claim 12, wherein the indirect next hop data comprises a set of data pointers stored within the leaf nodes.

Claim 15 (Original): The computer-readable medium of claim 14, wherein the data pointers include pointers to primary next hops and pointers to backup next hops.

Claim 16 (Original): The computer-readable medium of claim 12, wherein the second data structure comprises an array of ~~the~~ next hop data elements.

Claim 17 (Currently Amended): A router comprising:

a computer-readable medium to store: (i) ~~route data representing routes within a computer network~~ a forwarding tree having a set of nodes, wherein the nodes include leaf nodes that correspond to destinations within a computer network, and , (ii) next hop data, external to the forwarding tree, representing neighboring network devices, and (iii) indirect next hop data, within the leaf nodes of the forwarding tree, that maps ~~at least a subset of route data to a common portion of~~ the leaf nodes of the forwarding tree to the next hop data; and

a control unit that identifies a key within a network packet, traverses a path through the forwarding tree by testing bits of the key until reaching one of the leaf nodes of the forwarding tree,

wherein, upon reaching a leaf node of the traversed path, the control unit uses the indirect next hop data within the leaf node of the traversed path to select a next hop from the next hop data external to the forwarding tree and forwards the packet to the selected next hop.

Claim 18 (Original): The router of claim 17, wherein the indirect next hop data comprises a set of data pointers stored within the leaf nodes.

Claim 19 (Original): The router of claim 18, wherein the data pointers include pointers to primary next hops and pointers to backup next hops.

Claim 20 (Original): The router of claim 17, wherein some of the next hop data represents software modules for processing data packets.

Claim 21 (Original): The router of claim 20, wherein each of the software modules is selected from one of a packet filter, a policy enforcer and a packet counter.

Claim 22 (Currently Amended): The router of claim 17, wherein the ~~route data~~ forwarding tree is arranged ~~to form~~ as a radix tree ~~having a set of leaf nodes corresponding to destinations within the network~~.

Claim 23 (Currently Amended): The router of claim 22,

wherein the indirect next hop data includes a set of data pointers associated with the leaf nodes, and

wherein the data pointers reference portions of the next hop data stored external to the forwarding tree.

Claim 24 (Currently Amended): A router comprising:

a routing engine to store routing information representing a topology of a network; and

a packet forwarding engine to store packet forwarding information in accordance with the routing information, the packet forwarding information including (i) a forwarding tree having a set of nodes, wherein the nodes include leaf nodes that correspond to destinations within a computer network, and , ~~route data representing destinations within a computer network~~, (ii) next hop data external to the forwarding tree, representing interfaces to neighboring network devices, and (iii) indirect next hop data, within the leaf nodes of the forwarding tree, that maps the leaf nodes of the forwarding tree to ~~a subset of the routes represented by the route data to a common portion of~~ the next hop data.

Claim 25 (Currently Amended): The router of claim 24, wherein the routing engine receives a packet comprising network topology update information and, in response to the network topology update information, updates the routing information and directs the packet forwarding engine to modify ~~one of~~ the next hop data.

Claim 26 (Original): The router of claim 24, wherein the routing information includes data structures storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine.

Claim 27 (Original): The router of claim 26, wherein the routine engine analyzes the data structures to identify the next hop for modification.

Claim 28 (Currently Amended): A computer-readable medium having instruction therein for causing a programmable processor within a router to:

~~store route data representing routes within a computer network;~~

store, within a network router, a forwarding tree having a set of nodes, wherein the nodes include leaf nodes that correspond to destinations within a computer network;

store, external to the forwarding tree, next hop data representing network devices neighboring the ~~a~~ network router; ~~and~~

store, within the leaf nodes of the forwarding tree, indirect next hop data that maps ~~at least a subset of the routes represented by the route data to a common portion of~~ the leaf nodes of the forwarding tree to the next hop data, wherein at least two of the leaf nodes of the forwarding tree contain indirect next hop data that references the next hop data for the same neighboring network device;

identify a key within a network packet;

traverse a subset of the nodes of the forwarding tree within a network device by testing at least one bit of the key per each of the traversed nodes, wherein values of the tested bits in the key determine a path traversed along the forwarding tree until reaching one of the leaf nodes of the forwarding tree;

upon reaching a leaf node of the traversed path, use the indirect next hop data within the leaf node of the traversed path to select a next hop from the next hop data external to the forwarding tree; and

forward the packet to the selected next hop.

Claim 29 (Currently Amended): The computer-readable medium of claim 28, wherein the instructions cause the processor to store the forwarding tree as ~~route data comprises storing~~ a radix tree ~~having a set of leaf nodes, wherein each leaf node corresponds to a destination within the network~~.

Claim 30 (Currently Amended): The computer-readable medium of claim 29, wherein the instructions cause the processor to store the indirect next hop data as a respective data pointer within each of the leaf nodes,

wherein the data pointer within each of the leaf nodes reference the next hop data external to the forwarding tree.

Claim 31 (Original): The computer-readable medium of claim 28, wherein the instructions cause the processor to store an array of next hop data elements, and further wherein the portion of the next hop data comprises at least one next hop data elements.

Claim 32 (Currently Amended): The computer-readable medium of claim 28, the instructions cause the processor to:

receive a packet comprising network update information; and

modify the ~~common portion of the~~ next hop data in response to the network update information.

Claim 33 (Currently Amended): The computer-readable medium of claim 28, the instructions cause the processor to:

store routing information within a routing engine, wherein the routing information represents routes within a network; and

store the forwarding tree ~~route data~~, the indirect next hop data and the next hop data within a packet forwarding engine.

Claim 34 (Currently Amended): The computer-readable medium of claim 33, the instructions cause the processor to:

receive a packet comprising network topology update information;

update the routing information within the routing engine; and

issue a message from the routing engine to direct the packet forwarding engine to modify the ~~common portion of the~~ next hop data external to the forwarding tree in response to the network update information without modifying the forwarding tree.

Claim 35 (Currently Amended): The computer-readable medium of claim 33, wherein the instructions cause the processor to store a copy of the forwarding tree~~route data~~, the indirect next hop data and the next hop data stored within the packet forwarding engine.

Claim 36 (Currently Amended): The computer-readable medium of claim 33, wherein the instructions cause the processor to store a copy of the forwarding tree~~route data~~, the indirect next hop data and the next hop data stored within the packet forwarding engine, and issuing the message comprises analyzing the copy to identify the next hop for modification.

Claim 37 (Currently Amended): A method comprising routing packets within a network using indirect next hop data that maps leaf nodes of a forwarding tree to ~~associates a plurality of routes with a common portion of~~ next hop data stored external to the forwarding tree,

wherein the leaf nodes correspond to destinations within a computer network,

wherein the next hop data represents next hops within a network, and

wherein at least two different ones of the leaf nodes of the forwarding tree contain indirect next hop data that references a same next hop within the next hop data.

Claim 38 (Cancelled).

Claim 39 (Currently Amended): The method of claim 37, further comprising storing the indirect next hop data within the leaf nodes as pointers to primary next hops and pointers to backup next hops.

Claim 40 (Currently Amended): The method of claim 3738, wherein ~~storing the route data comprises storing~~ the forwarding tree comprises a radix tree ~~having a set of leaf nodes, wherein each leaf node corresponds to a destination within the network, and further wherein storing the indirect next hop data comprises storing a data pointer within each of the leaf nodes~~.

Claim 41 (Currently Amended): The method of claim 37, further comprising:

receiving a packet comprising network update information; and

modifying the ~~common portion of the~~ next hop data in response to the network update information.

Claim 42 (Original): The method of claim 37, further comprising storing the indirect next hop data within a packet forwarding engine.

Claim 43 (Currently Amended): The method of claim 42, further comprising:

receiving a packet comprising network topology update information;

issuing a message from a routing engine to direct the packet forwarding engine to modify the ~~common portion of the~~ next hop data in response to the network update information.

Claim 44 (Original): The method of claim 42, further comprising storing a copy of the indirect next hop data within a routing engine.